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PCT/NZ03/00280

CERTIFICATE

This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 18 December 2002 with an application for Letters Patent number 523237 made by GEORGE WILLIAM MASON, JOHN BRODIE MATTHEWS, JOHN SUTHERLAND AULD, PETER JAMES HAYWARD AND CHRISTINE ANNE HAYWARD.

I further certify that pursuant to a claim under Section 24(1) of the Patents Act 1953, a direction was given that the application proceed in the name of TARANAKI NUCHEM LIMITED.

Dated 7 January 2004.

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523237

NEW ZEALAND

Patents Act 1953

PROVISIONAL SPECIFICATION

IMPROVEMENTS IN PRESERVATIVES FOR WOOD-BASED PRODUCTS

WE, GEORGE WILLIAM MASON, JOHN BRODIE MATTHEWS, JOHN SUTHERLAND AULD, PETER JAMES HAYWARD AND CHRISTINE ANNE HAYWARD all New Zealand citizens of 78 Plymouth Road, R D 4, New Plymouth, New Zealand trading in partnership as TAPUAE PARTNERSHIP do hereby declare this invention to be described in the following statement:-

TITLE OF THE INVENTION

IMPROVEMENTS IN PRESERVATIVES FOR WOOD-BASED PRODUCTS

BACKGROUND TO THE INVENTION

The present invention relates to antifungal preservatives for wood-based glued products.

As a biological material, wood is subject to attack by fungi and insects. These organisms may damage the appearance of the wood, and they may seriously reduce its structural strength. Wood and wood-based products can be protected from the effects of wood destroying organisms by applying fungicides or insecticides, or both. Such treatments can greatly improve the service life of the wood product, especially for timbers with low natural durability, such as radiata pine.

For some wood-based products, conventional methods of applying preservative treatment are inappropriate. For example, water based treatments such as copper chrome arsenate ("CCA") cannot be applied to laminated veneer products, particle based products or fibre based products without causing significant degrade and product loss. Other post-manufacture treatments for these products, such as light organic solvent preservative ("LOSP") are

expensive and require a further processing step to achieve the treatment, creating extra cost.

A method favored by some wood-based product manufacturers is the application of a preservative by addition to the glue system during manufacture. This approach can be used for any wood product that is constructed from relatively thin or small particles, such as wood fibre, wood chip or flake and thin wood veneer. Plywood, laminated veneer lumber (LVL), medium density fibreboard (MDF), strandboard/OSB and particleboard fall into this category.

The major drawbacks with this method of application lie in the nature of the glues or glue systems used in the manufacturing process and the type of compounds available for treatment.

In general, glue systems for wood based products have high pH (9-12) or are highly reactive (e.g. isocyanate based glues). Thus the addition of a compound to such an environment can result in rapid degradation of the molecule. A further challenge to the robustness of the added compound is the curing condition for the glues. These are often high temperatures (~170°C) in a high pressure pressing system.

These conditions require that any added preservative be robust enough to retain at least some of its activity to be effective during the service life of the product.

In Japan, where this type of in-process addition of preservatives is common, only a limited number of compounds are deemed to be effective. Amongst these are some of the common triazoles, namely tebuconazole, propiconazole and cyproconazole.

It has been disclosed that triazoles are generally effective against the *Basidiomycetes* , which are the fungi known to cause decay in wood. The triazoles most commonly used to protect solid wood from decay are tebuconazole and propiconazole. The amount of active ingredient needed in the wood to protect from decay has been shown to be in the order $50g/m^3$ wood to $300g/m^3$ wood for tebuconazole and $220g/m^3$ wood to $490g/m^3$ wood for propiconazole. It has also been disclosed that these two triazoles can act synergistically in some cases.

Furthermore, due to the nature of the glue systems, the triazoles that show activity in solid wood applications have to be added in large quantities to the glue mixture due to subsequent breakdown in the process.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an antifungal preservative for wood-based glued products where the preservative is mixed with the glue or glue system used and improved levels of performance relative to the amount of preservative added are exhibited.

According to the second broad aspect the invention provides in the production of wood-based glued products, the addition to the glue or glue system, triadimefon as a preservative.

In a third broad aspect of the present invention provides a glue or glue system for use in wood-based glued products characterized in the addition to the glue or glue system, triadimefon as a preservative.

Broadly according to one aspect of the present invention there is provided an antifungal preservative for wood-based glued products based on the addition of triadimefon as the preservative mixed with the glue.

In a preferred form of the invention, the preservative contains a solvent compatible with the glue formulation or the preservative is suspended in water such that the water may become a component of the glue mix.

Preferably the preservative further includes a glue-compatible insecticide.

According to a further aspect of the invention there is provided an antifungal preservative for wood-based products based on the addition of triadimefon as the preservative mixed with glue and an insecticide compatible with the glue, said preservative containing a solvent compatible with the formulation of the glue or is suspended in water such that the water may become a component of the glue mix

MORE DETAILED DESCRIPTION OF THE INVENTION

1-(4-chlorophenoxy)-3, 3-dimethyl-1-(1H-1,2,4-triazolyl) butan-2-one (triadimefon) is an older triazole used in agriculture for *Basidiomycete* control. It is being superseded in these uses by newer triazole molecules, such as propiconazole and tebuconazole, because of their higher activity at lower use rates.

Table 1. Agriculture use rates for selected triazoles.

Active	Use rate range g/ha

	(agricultural uses)[1]
Propiconazole	100-150
Tebuconazole	100-250
Triadimefon	125-500

[1] Data from The Pesticide Manual, 12th Edition. British Crop Protection Council, Farnham, Surrey, UK. 2000

The novelty of the selection of triadimefon as a wood preservative lies in its surprising activity in specialty application through glueline addition to wood-based, glued products.

When the known triazoles are applied to wood based products, strandboard, particleboard, MDF, plywood and LVL being examples of such, via the glueline, the expected levels of performance are not met at a said active content as would be expected. However, under these conditions, triadimefon shows remarkable and consistent efficacy at surprisingly low levels.

The novel nature of this activity renders the triazole molecule triademefon particularly suitable to the protection of glued wood based products from attack by

certain decay causing fungi, by application via a glueline at surprisingly low rates.

Example 1:

Effective dosing rates for tebuconazole, propiconazole and triadimefon

Table 2

Use rate gai/m^3	Efficacy against target organism (expressed as weight loss percent in a standard rot trial with *Tyromyces palustris* as the target species)[1]		
	Tebuconazole	Propiconazole	Triadimefon
80	9.2	-	-
100	-	20.5	3.7
160	20.9	-	-
200	-	7.6	0.5
320	6.3	-	-
400	-	21.4	0.9
640	18.5	-	-
800	-	1.8	1.4
Untreated	17.5		
Commercial Standard LOSP[2]	5.8		

[1] Using Japan Wood Preservers Assn Standard Test procedure
[2] Tributyltin oxide

In addition to its use as a fungicide in glueline application, an effective preservative for wood-based glued products can be formulated by the inclusion of an insecticide that is known to be effective when applied via the glueline. Appropriate compounds include synthetic pyrethroids and neo-nicotinoids. Mixtures of insecticides with triadimefon at appropriate rates will provide a simple one step application of preservative and gluing system for in-process treatment of most wood-based composites.

The present invention thus provides an antifungal preservative for wood-based glued products which includes triadimefon as a preservative which can be mixed with the glue and exhibits remarkable and consistent efficacy at surprisingly low levels. The preservative can contain a solvent compatible with the glue formulation. The preservative can alternatively be suspended in water such that the water may become a component of the gluemix. The preservative can be a broad protection preservative by the addition of a glue-compatible insecticide.

GEORGE WILLIAM MASON, JOHN BRODIE MATTHEWS, JOHN SUTHERLAND AULD, PETER JAMES HAYWARD AND CHRISTINE ANNE HAYWARD trading in partnership as TAPUAE PARTNERSHIP
By their Attorney
DON HOPKINS & ASSOCIATES
Per: